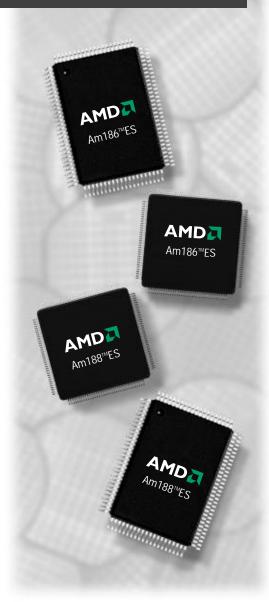# E86 FAMILY

AMD Am186™ES and Am188™ES Microcontrollers

AMD

High-Performance, 80C186/188-Compatible, 16-Bit Embedded Microcontrollers

The Am186™ES and Am188™ES microcontrollers combine the familiarity of the 80C186/188 microcontroller architecture, but with higher performance—and more features than the Am186EM and Am188EM microcontrollers. Compared to the 80C186/188 microcontrollers, the Am186ES and Am188ES microcontrollers can reduce the size, power consumption, and cost of embedded systems, while increasing functionality and performance.

The Am186ES and Am188ES microcontrollers offer application-specific features that enhance system functionality over the Am186EM and Am188EM microcontrollers, including serial ports that can be connected directly to the DMA channels. In addition, the Am186ES and Am188ES microcontrollers can integrate the functions of the CPU, including demultiplexed address bus, three timers, chip selects, interrupt controller, two DMA controllers, watchdog timer, two asynchronous serial ports, and 32 programmable I/O (PIO) pins all on one chip.

PRODUCT HIGHLIGHTS

E86™ Family 80C186/188-Compatible Microcontrollers With Enhanced Bus Interface
- 20-, 25-, 33-, and 40-MHz operating frequencies
- Supports zero-wait-state operation at 40 MHz with 70-ns static memory
- 1-Mbyte memory address space
- 64-Kbyte I/O space
- 3.3-V to 5-V operating range

Software Compatible with the 80C186/188 Microcontrollers

Improved Memory Access
- Nonmultiplexed address bus
- Programmable bus sizing
- 1x clocking

Increased Functionality
- Two full-featured asynchronous serial ports allow full-duplex, 7-bit, 8-bit, or 9-bit data transfers

- DMA to and from the serial ports
- Independent serial port baud rate generators
- Multidrop 9-bit serial port protocol
- Thirty-two programmable I/O (PIO) pins
- Watchdog timer can generate NMI or reset
- A pulse-width demodulation option

Familiar 80C186 Peripherals
- Two independent DMA channels
- Programmable interrupt controller with up to eight external and eight internal interrupts
- Three programmable 16-bit timers
- Programmable memory and peripheral chip-select logic
- Programmable wait state generator
- Power-save clock divider

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PRODUCT DESCRIPTION

The Am186ES and Am188ES microcontrollers are based on the architecture of the original Am186 and Am188 microcontrollers and function in the enhanced mode of the Am186EM and Am188EM microcontrollers. The Am186ES and Am188ES microcontrollers increase the performance of existing 80C186/188 systems, while decreasing system cost.

The Am186ES and Am188ES microcontrollers have been designed to meet the most common requirements of embedded products developed for the office automation, mass storage, communications, and general embedded markets. Specific applications include disk drives, handheld, settop, and desktop terminals, fax machines, printers, photocopiers, feature phones, cellular phones, PBXs, multiplexers, modems, and industrial controls.

FEATURE:	AMD 80C186 AMD 80C188	Am186ES Am188ES
Processor Core	Am186	Am186
Address Range	1 Mbyte	1 Mbyte
Interrupts	10	16
DMA Channels	2	2
Timers	3	3
Memory Controller	Refresh	SRAM FLASH EPROM
Chip Selects	13	12
PIOs	–	32
Async. Serial Ports	–	2
Sync. Serial Ports	–	–
Voltage	3.3 V*, 5 V	3.3 V**, 5 V
Frequency (MHz)	10, 12.5, 16, 25	20, 25, 33, 40

*3.3 V 80L186, 80L188 microcontrollers are available in 10-, 12.5-, and 16-MHz speeds.
**3.3 V Am186ESLV, Am188ESLV microcontrollers are available in 20- and 25-MHz speeds.

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One AMD Place
P.O. Box 3453
Sunnyvale,
California 94088-3453
408-732-2400
800-538-8450
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JAPAN 03-3346-7550
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EUROPE & UK +44-(0)-1276-803299
Fax +44-(0)-1276-803298
BBS +44-(0)-1276-803211
FRANCE 0800-908621
GERMANY 089-450-53199
ITALY 1678-77224

ARGENTINA 001-800-200-1111,
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CHILE 800-570-048
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PC CPU Technical Support E-mail: hwsupt@brahms.amd.com
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